

STANDARD SPECIFICATION
SECTION 15K
COMPRESSED GAS PIPING - INTERIOR

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STANDARD SPECIFICATION
SECTION 15K
COMPRESSED GAS PIPING - INTERIOR

15K-01. SCOPE

- a. **Included:** Materials and operations required for the installation of interior medium to low pressure compressed gas piping systems, including argon, helium, nitrogen, oxygen, hydrogen, anhydrous ammonia, chlorine, acetylene, and methane piping, fittings, valves, equipment, joints, and tests.

15K-02. MATERIALS

Materials shall be as follows unless otherwise indicated on the applicable contract drawings. Pipe and fittings to be used for modifications or additions shall be the same material (steel or copper) as the existing systems being modified but shall conform to the following unless otherwise indicated on the applicable contract drawings.

- a. Argon, Helium and Nitrogen Systems (100 psig and under):
 - (1) **Piping:** Type L, hard drawn copper tubing, ASTM B88-72, or schedule 40 black steel, seamless or welded, ASTM A120-72a.
 - (2) **Fittings:** Wrought copper and bronze solder-joint, ANSI B16.22-63; or 2000 pound forged steel socket weld, ANSI B16.11-66.
 - (3) **Valves:**
Ball: Worcester No. 416T, brass body, stainless steel ball and stem, teflon seat, 250 p.s.i. maximum working pressure.
- b. **Oxygen Systems (50 psig and under):** NOTE: Oil and oxygen may combine with explosive violence.
 - (1) **Piping:** Type L hard drawn copper tubing, ASTM B88-72 or Schedule 40 black steel, seamless, ASTM A120-72a.
 - (2) **Fittings:** Wrought copper and bronze solder-joint, ANSI B16.22-63; or 2000 pound forged steel socket weld, ANSI B16.11-66 (cast iron not permitted).
 - (3) **Valves:**
Ball: Worcester No. X416T, brass body, stainless steel ball and stem, teflon seat, cleaned and packaged for oxygen service, 250 p.s.i. maximum working pressure.

- c. Hydrogen Systems (50 psig and under):
- (1) Piping: Schedule 40 black steel, seamless Grades A or B, ASTM A53-72a.
 - (2) Fittings: 2000 pound forged steel socket weld, ANSI B16.11-66.
 - (3) Valves:

Globe: Fulton-Sylphon No. 3000, packless, 150 psig rating, 375° F. maximum temperature, brass body, integral seat.

Ball: Worcester No. 416T, brass body, stainless steel ball and stem, teflon seat, 250 p.s.i. maximum working press.
- d. Anhydrous Ammonia Systems (150 psig and under): NOTE: No brass, bronze, copper or galvanized valves, gauges, regulators, fittings, etc. shall be used due to the corrosive action of ammonia on these metals.
- (1) Piping: Schedule 80 black steel, seamless Grades A or B ASTM A53-72a.
 - (2) Fittings: 2000 pound forged steel socket weld, ANSI B16.11-66.
 - (3) Valves:

Globe: Crane No. 222 H, bar stock, steel, 3000 p.s.i.
- e. Chlorine Systems (50 psig and under):
- (1) Piping: Schedule 80 black steel, seamless Grades A or B, ASTM A53-72a.
 - (2) Fittings: 2000 pound forged steel socket weld, ANSI B16.11-66.
 - (3) Valves:

Needle: Matheson No. 109, screwed, monel construction
- f. Acetylene Systems (15 psig and under): NOTE: Contact between acetylene and unalloyed copper should be avoided, since the explosive compound, copper acetylide, might be formed.
- (1) Piping: Schedule 40 black steel, seamless Grades A or B, ASTM A53-72a.
 - (2) Fittings: 2000 pound forged steel socket weld, ANSI B16.11-66. (Cast iron not permitted).
 - (3) Valves: Crane No. 1652 (Underwriters' Approved) 15 p.s.i. rating, 180° F. maximum.
- g. Methane Systems (50 psig and under):
- (1) Piping: Schedule 40 black steel, seamless Grades A or B, ASTM A53-72a.
 - (2) Fittings: 2000 pound forge steel socket weld, ANSI B16.11-66.

(3) Valves:

Ball: Worcester No. 416T, brass body, stainless steel ball and stem, teflon seat, 250 p.s.i., maximum w.p.

15K-03. EQUIPMENT.

All major items of equipment required for installation on this contract shall be as specified on the applicable contract drawings and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory operating system.

- a. Relief Valves: Shall be ASME constructed and stamped. Size, capacity and setting shall be as indicated on the drawings. Discharge from relief valves shall be piped full size and extended to the outside where required.

15K-04. PIPING INSTALLATION.

- a. General: Piping installation shall be coordinated with respect to space available with heating, ventilating and electrical installation. In every instance where there is a conflict in the routing of the piping and the ducting, the routing of the ducting shall govern. Installed piping shall not interfere with the operation or accessibility of doors or windows; shall not encroach on aisles, passageways, and equipment; and shall not interfere with the servicing or maintenance of equipment. Pipe shall be cut accurately to measurements established at the construction site and shall be worked into place without springing or forcing, properly clearing all openings and equipment. Cutting or weakening of structural members to facilitate piping installation is not permitted. Pipes shall have burrs removed by reaming and shall be so installed as to permit free expansion and contraction without damage to joints or hangers. Piping above ground shall be run parallel with the lines of the building unless otherwise noted on the drawings.

Piping connections to equipment shall be in accordance with details shown on the drawings. Service pipe, valves, and fittings shall be kept a sufficient distance from other work to permit finished covering not less than 1/2 inch from such other work, and not less than 1/2 inch between finished covering on the different services.

- b. Reducers: Reduction in pipe sizes shall be made with one-piece reducing fittings. Bushings reducing at least two pipe sizes will be acceptable only when there is no room for reducing couplings or swagged nipples.
- c. Unions: All piping unions shall be of the ground joint type constructed from materials equivalent in alloy composition and strength to other fittings specified with which they are used. Union pressure classes and end connections shall be the same as the fitting used in the lines with the unions.

Steel unions shall have hardened stainless steel seating surfaces on both faces.

- d. Installation of Valves: Valves shall be installed at the locations shown on the drawings and where specified. All valves shall be installed with their stems horizontal or above.

- e. Pipe Hangers: Unless otherwise noted on the drawings, horizontal overhead runs of pipe shall be hung with adjustable wrought-iron or malleable-iron pipe hangers, spaced not over 8 feet apart. Tubing shall have hangers spaced not over 5 feet apart. Chain strap, perforated-bar, or wire hangers will not be permitted. Trapeze hangers may be used in lieu of separate hangers on pipes running parallel to each other and close together. All hangers shall have short turnbuckles or other approved means of adjustment, and should be suspended from structural members. Hangers and collars shall be of a size proportionate to the weight of the pipe supported. Where the piping is attached to metal partitions, full-length through bolts shall be used with large washers, on both sides. Copper pipe hangers shall be copper or copper plated. Piping in tunnels or chases shall be supported on Unistrut or approved equal, as indicated on the drawings.
- f. Joints:
- (1) Screwed Joints: Screwed pipe joints shall have American Standard Taper Pipe Threads ANSI B2.1-68. Burrs formed when cutting pipe shall be removed by reaming. Care shall be taken that the inside of pipe is thoroughly clean and free of cutting oil and foreign matter before installation. Joints shall be made perfectly tight by the use of Teflon tape or approved Teflon thread sealing and lubricating compound.
 - (2) Solder-Joints: Tubing shall be cut square and burrs removed. Both inside of fittings and outside of tubing shall be well cleaned with steel wool or wire brush before sweating. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connections. Joints for sweated fittings on low pressure piping (150 psig and below) shall be made with a noncorrosive paste flux and solid wire solder composed of 95 percent tin and 5 percent antimony. Cored solder will not be permitted.
 - (3) Welded Joints: Joints between sections of pipe and between pipe and fittings may be welded using either gas or electric welding equipment. All pipe surfaces shall be thoroughly cleaned before welding. Each joint, except socket-weld joints, shall be beveled before being welded. The Contractor shall provide an asbestos mat or blanket to protect the structure and adequate fire protection equipment at all locations where welding is done. All elbows shall be long radius where space conditions allow. Wherever tee connections are made to piping systems on the main run, welding sockets or weldolets may be used in lieu of reducing outlet tees for branch connections up to one-half the size of the main run. On connections larger than one-half the size of the main run, welding tees shall be used. The use of fittings formed from welded pipe sections will not be permitted. All welding shall conform with "General Material and Work Requirements, Mechanical" section of these specifications.

15K-05 PIPE CLEANING.

Unless otherwise amended on the drawings, the requirements in this section pertain with one exception: if refrigeration grade piping is utilized, these cleaning requirements are limited to oxygen systems only.

- a. Before Installation: All piping, tubing, valves and fittings are to be thoroughly cleaned as follows:

- (1) Copper lines (unless furnished precleaned and capped) shall be washed in a solution of tri-sodium phosphate (1 pound to 3 gallons of water, rubber gloves required). Scrubbing to be employed as required to assure removal of dirt, metal filings, oil and grease. After washing, materials to be rinsed in clear, hot water. After drying, materials shall be plugged or capped until assembly.
 - (2) Black steel lines, before assembly, shall be hammered to loosen scale and wire brushed inside as required. Following scale removal pipe shall be cleaned and stored as described for copper until assembly.
- b. After Installation: Completed oxygen piping systems shall be thoroughly flushed internally with a solution of tri-sodium phosphate (1 pound to 3 gallons of water, rubber gloves required) to remove any traces of oil due to piping assembly, flush-rinsed with clear hot water, dried and capped.

15K-07. TESTS.

- a. General: All piping, equipment, and accessories installed under this contract shall be inspected and tested by the Contractor in the presence of the Inspector, and approved before acceptance. All labor, material, and equipment required for testing shall be furnished by the Contractor. The Contractor shall be responsible for all repairs and retesting as required. All instruments and other equipment whose safe pressure range is below that of the test pressure shall be removed from the line or blanked off before applying the tests.
- b. Testing: Compressed gas piping shall be tested at the test pressures specified and shall not exceed the following drop in pressure in a 24 hour period. Use F-12 and an electronic leak detector to locate leaks in systems that allow no press drop in a 24 hour period. All other system leaks shall be located by soap testing.

<u>Compressed Gas</u>	<u>Test Pressures</u>	<u>Test Gas</u>	<u>Max. Pressure Drop</u> (24 hrs)
<u>Nitrogen Systems</u>	150 psig	Nitrogen	5 p.s.i.
<u>Argon Systems</u>	150 psig	Argon	5 p.s.i.
<u>Helium Systems</u>	150 psig	Helium	5 p.s.i.
<u>Oxygen Systems</u>	150 psig	Argon	5 p.s.i.
<u>Hydrogen Systems</u>	200 psig	Helium	None
<u>Anhydrous Ammonia</u>	225 psig	Nitrogen	5 p.s.i.
<u>Chlorine Systems</u>	200 psig	Nitrogen	5 p.s.i.
<u>Acetylene Systems</u>	200 psig	Nitrogen	None
<u>Methane Systems</u>	150 psig	Nitrogen	None